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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WANG, GEORGE Y

ART UNIT PAPER NUMBER

2882

DATE MAILED: 03/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/547,790

Applicant(s)

REININGER, FRANCIS M.

Examiner

George Y. Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 02 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 23-29 is/are allowed.
- 6) ☐ Claim(s) 1-12, 30, 32 and 33 is/are rejected.
- 7) ☐ Claim(s) 13-22, 31, 34 and 35 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 12 April 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minott (U.S. Patent No. 4,395,123) in view of Hill et al. (U.S. Patent No. 4,213,706, from hereinafter "Hill").

4. As to claim 1, Minott discloses a beam shearing system for shearing an incident beam of light having a chief ray, having an entrance slit structure (fig. 5, ref. 38) receiving light at a predetermined spectral pass band (fig. 5, ref. 34), a beam splitter (fig. 5, ref. 60) aligned at an angle to the first direction so that the received beam is split into two (fig. 5, ref. 44, 46), and a reflective subsystem with a plurality of reflective

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surfaces that define the separate light paths such that when the two substantially parallel beams (fig. 5, ref. 50, 58) emerge from the system with more than 50% of the photon flux, that produces nearly all of the light entering the system.

However, Minott fails to specifically disclose a reflective subsystem with a plurality of bodies surrounding a beam splitter such that the entrance and exit surfaces of the plurality of bodies produces substantially parallel beams that are substantially perpendicular to the chief ray of the received beam of light.

Hill discloses a beam shearing interferometer with a reflective subsystem with a plurality of bodies surrounding a beam splitter such that the entrance and exit surfaces of the plurality of bodies produces substantially parallel beams that are substantially perpendicular to the chief ray of the received beam of light (fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have arranged the entrance and exit of the plurality of bodies such that the beams are substantially perpendicular since one would be motivated to reduce the interference of background light commonly associated with internal and external sources (col. 2, lines 37-44). Furthermore, the reduction of the effects of background light also minimizes the amplitude of background radiation in the vicinity of the desired image, eliminating much unwanted lens irregularities, inclusions, and dust and ultimately optimizing image quality (col. 1, lines 12-26).

5. Regarding claims 2-5, the Minott reference further discloses that the two exiting beams (fig. 5, ref. 50, 58) are parallel to each other and have substantially equal optical

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path lengths, causing wave fronts of the beams to remain substantially in phase relative to one another. In addition, the plurality of reflective surfaces are arranged so that the separate beams of light are of substantially equal intensity (col. 2, lines 49-63) when they emerge from the beam shearing system.

6. Claims 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanba et al. (U.S. Patent No. 5,999,311, from hereinafter "Nanba") in view of Minott.

7. As per claims 6 and 7, Nanba discloses a spectral resolving system with an optical system focusing beams of light onto an exit pupil (col. 22, lines 60-63) to create an image; however, the Nanba reference fails to specifically disclose a beam shearing system having an entrance slit structure receiving light at a predetermined spectral pass band, a beam splitter aligned at an angle to the first direction so that the received beam is split into two, and a reflective subsystem with a plurality of reflective surfaces that define the separate light paths such that when the two parallel beams emerge from the system with more than 50% of the photon flux, producing nearly all of the light entering the system.

Minott and Hill disclose a beam shearing system having an entrance slit structure (fig. 5, ref. 38) receiving light at a predetermined spectral pass band (fig. 5, ref. 34), a beam splitter (fig. 5, ref. 60) aligned at an angle to the first direction so that the received beam is split into two (fig. 5, ref. 44, 46), and a reflective subsystem with a plurality of reflective surfaces that define the separate light paths such that when the two parallel

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beams (fig. 5, ref. 50, 58) emerge from the system with more than 50% of the photon flux, producing nearly all of the light entering the system.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the beam shearing system of Minott with the spectral resolving system since one would be motivated to pick up an image before magnifying it or refining it through a spectral resolving system. One skilled in the art would recognize that such a combination would meet the objectives of the spectral resolving system by providing high variable magnification using methods that reduce aberrations and enhance quality image formation.

8. Regarding claims 8-11, Nanba teaches an optical system having an optical axis and is located on a tangential plane and a sagittal plane relative to entering beams and image. Moreover, the spectral resolving system has an optical system that is telecentric (col. 23, lines 15-18) in the exit pupil plane, anamorphic (col. 15, lines 54-60), and cancels aberrations (col. 23, lines 49-68) when it recombines the beams of light.

9. Claims 12 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanba, Minott, and Hill, in view of Lin (U.S. Patent No. 4,531,197).

Nanba, Minott, and Hill disclose the static interferometer recited above. However, the reference fail to specifically teach a fore-optics having an asymmetric pupil and configured to collect and focuses light into a beam.

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Lin discloses a fore-optics (fig. 3) of a shifted pupil design that collects and focuses light into a beam for entry into the spectral resolving system and a detector (fig. 3, ref. 124) located at the exit pupil to receive and process image data. Furthermore, the references do not specifically disclose data processing using Fast Fourier Transforms (col. 5, lines 42-60) on the digitized measurements to obtain spectral composition of the incident radiation and digital filters (col. 7, lines 43-44) to detect the presence or absence of characteristically incident radiation by particular substances.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included a fore-optics and detector as suggested above since one would be motivated to by freedom from an environment of perturbation (coll. 1, lines 62-64), which increase accuracy of Fast Fourier Transforms data processing. Furthermore, according to Lin, in performing real-time Fourier Transforms, one skilled in the art would also recognize the ability to create compact and low-power transformers that ultimately decrease manufacture and utilization costs (col. 1, lines 60-61).

10. Claims 30 and 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minott and Hill in view of Schaffer (U.S. Patent No. 4,773,732).

Minott and Hill disclose the beam shearing system as recited above, however, the references fail to specifically disclose a first prism that serves as the beam splitter and second prism positioned to create an air gap between both prisms so as to prevent total internal reflection.

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Schaffer discloses an interferometric beam shearing system that splits an incident beam with dual prisms (col. 1, lines 16-26) having an air gap.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used dual prisms to split a beam since one would be motivated to prevent total internal reflection (col. 1, lines 16-26). Ultimately, this is important maintaining precision control where light is at relatively high intensities (col. 2, lines 8-16).

***Allowable Subject Matter***

11. Claims 23-29 are allowed.

The following is an examiner's statement of reasons for allowance: As the claims were read and interpreted in light of the specification, the prior art of record fails to specifically disclose fore-optics of a shifted pupil design that collects and focuses light into a beam for entry into the spectral resolving system and a detector located at the exit pupil to receive and process image data. Furthermore, the references do not specifically disclose data processing using Fast Fourier Transforms on the digitized measurements to obtain spectral composition of the incident radiation and digital filters to detect the presence or absence of characteristically incident radiation by particular substances.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably



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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

12. Claims 13-22, 31, and 34-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: As the claims were read and interpreted in light of the specification, the prior art of record fails to specifically disclose fore-optics of a shifted pupil design that collects and focuses light into a beam for entry into the spectral resolving system and a detector located at the exit pupil to receive and process image data. Furthermore, the references do not specifically disclose data processing using Fast Fourier Transforms on the digitized measurements to obtain spectral composition of the incident radiation and digital filters to detect the presence or absence of characteristically incident radiation by particular substances.

### ***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Y. Wang whose telephone number is 703-305-7242. The examiner can normally be reached on M-F, 8 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 703-305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

gw  
March 4, 2003

